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CURRENT DENTAL HEALTH KNOWLEDGE
OF
SELECTED ARMY MEDICAL SERVICE PERSONNEL

by, Amy D. Geissinger

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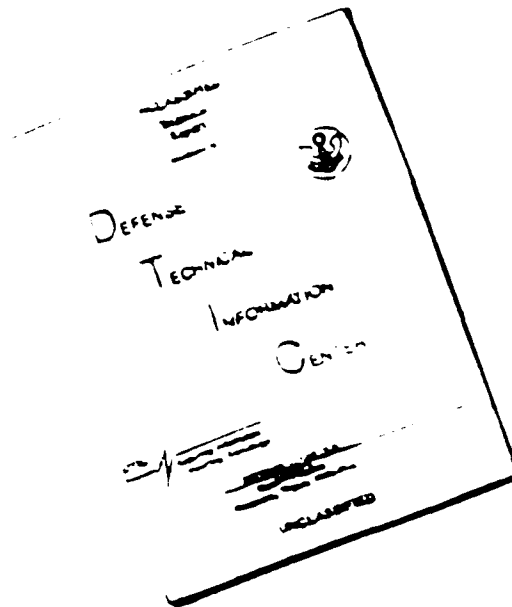
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**CURRENT DENTAL HEALTH KNOWLEDGE
OF
SELECTED ARMY MEDICAL SERVICE PERSONNEL**

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ACKNOWLEDGMENT

Grateful appreciation is expressed to a former University of Michigan classmate for permission received to capitalize on the idea provided and findings obtained in her study of the Dental Health Knowledge of Public Health Nurses in Iowa. Gratitude is expressed to the Chief, Preventive Dentistry, United States Army Institute of Dental Research, and the members of the Department of Nursing, Walter Reed Army Institute of Research, for their interest and helpful assistance with this study.

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CHAPTER I

INTRODUCTION

Dental caries or tooth decay and periodontal disease--- better known to the soldier as pyorrhea--- are the most prevalent disease[s] in the human race.¹

Dental Health Problem in the United States

Dentists and public health workers have expressed concern over the amount of dental caries and periodontal disease existing among the American population in this "land of plenty." As late as 1961, the population of the United States was estimated to have approximately 700 million untreated carious lesions, or an average of four per person. By 50 years of age, nearly 50 percent of the American people will have developed periodontal disease; by age 65, nearly 100 percent of the population will have sustained this dental condition.²

Upon close examination, three major factors seem to be responsible for the immense disparity between what is done and what could be done to bring proper dental care to all persons living in the United States. These factors are as follows: (1) an apparent lack of awareness and concern on the part of the American people towards dental care; (2) an inadequate dentist to population ratio; and (3) the high cost of dental care.³

Factors Related to the Dental Health Problem

The first of these factors to be considered is the apparent lack of awareness and concern the American people have for the importance of "good dental health."

Although most people believe teeth to be important, they apparently

have little understanding of the results of dental neglect. There seems to be a feeling that artificial teeth can serve as well as natural teeth, and that it really isn't worth too much time, effort and money to retain one's own teeth when dentures are so readily available.⁴

Along with this understanding, there appears to be a common belief that the loss of one's teeth and the need for artificial dentures are inevitable.

A study conducted by the Bureau of Dental Health Education of the American Dental Association in 1958 revealed that a majority of the adult patients believed that loss of teeth and wearing of dentures are inevitable.⁵

Another factor related to the dental health problem is the dentist to population ratio presently existing in the United States. The average dentist can probably care for 1000 patients but the present ratio is nearly twice that or about 1:1900.⁶ There are approximately 20,000 practicing dentists available at present, in the United States to provide dental care for the 180 million American people.⁷ In addition to the apparent shortage of dentists, the geographical location of these professional people intensifies the problem. A large majority of the dentist population can be found in the large cities, leaving only a small number to care for the increasing population in rural and suburban communities.

A third element contributing to the dental health problem is the high cost of dental care. Generally speaking, the American public is unable to pay for needed comprehensive dental care. As stated by Muhler, "the figure for dental care is 14 percent of the total medical dollar, and on a dollar basis is larger than the combined care of patients having

tuberculosis and heart disease."⁸ Very few communities offer free or low-cost dental care to their welfare or low-income population, with the possible exception of emergency dental treatment.⁹ Even those individuals in a higher economic level are unable to afford the cost of a comprehensive medical care plan that includes provisions for dental care.

Recommendations for Overcoming These Factors

The Commission on the Survey of Dentistry in the United States has proposed the following two broad approaches to bring to the American people the best dental prevention and care now possible. These approaches are:

First, widespread educational efforts must be undertaken to acquaint the American people with the importance of dental health and the means of attaining it.

Second, machinery must be set up to enable those who can not pay for dental care to obtain it at no cost or for a token fee, and to assist those who find dental care a financial burden to budget it on an installment plan or to prepay it through insurance programs.¹⁰

This Commission has recommended more specific solutions to the dental health problem. The first of these suggestions is the proposal to fluoridate city water supplies. "Fluoridation has been proved to reduce tooth decay rate by more than 50 percent among children exposed to it since birth."¹¹ This form of preventive therapy is convenient, inexpensive, absolutely safe, and would reach every member of a community on a minimal effort basis. Despite this evidence, open opposition towards approval of fluoridating community water supplies still exists. One possible reason for this opposition may be inadequate or incorrect interpretation by leading citizens in the community of the beneficial versus the adverse effects of fluoridation. Another possible reason may be a misunderstanding

of the relatively small cost of fluoridation in comparison to the benefits received. On an average, such water supply treatment costs only about 1/20 of that of the most simple amalgam restoration,¹² or about eight cents per person per year.¹³

Fluoridation of the community water supply is not in itself the panacea for dental caries reduction. In addition to drinking fluoridated water throughout life, a lasting effect of this reduction can only be brought about when each individual is motivated to employ proper toothbrushing methods, to eat an "adequate" diet, to avoid between meal snacks, and to use a fluoridated dentifrice for toothbrushing.¹⁴

The second recommendation of the Commission on the Survey of Dentistry in the United States offers suggestions for time-saving ways to increase the productivity of the available dentists. These time-saving means are: the establishment of group and multi-chair practices; the wider utilization of auxiliary personnel;¹⁵ and the application of the preventive measures science has already provided the dentist.¹⁶

Although dentists have traditionally practiced alone, since World War II they have shown tendencies to associate themselves in group practice. This form of practice includes one or more specialists in the group, thus enabling the patient to obtain both diagnosis and treatment under one roof. A group of dentists, furthermore, would employ a wider range of auxiliary dental personnel than is presently utilized. With the increased utilization of auxiliary personnel, multi-chair practice is particularly enhanced.

A recent study showed that the average dentist working alone can care for 704 patients, but that assisted by 2 auxiliary workers, he could shuttle between 2 chairs and increase his workload by 65 percent, to 1,174 patients annually.¹⁷

Dentists can apply, in their individual practices, preventive measures proven by recent studies to be effective in reducing the amount of dental caries in the population. Some of these measures are: a single topical application of stannous fluoride annually to the tooth structures of the patient rather than a series of 4 applications of a sodium fluoride solution per year;¹⁸ providing fluoride tablets to those individuals residing in areas not furnished with fluoridated water; and supplying dental health information regarding the proper mechanical cleansing of the teeth at home between dental office visits.¹⁹

The third recommendation offered by the Commission on the Survey of Dentistry in the United States is in the broad area of dental health education for the American people. "Education in the dental health sense, has many facets, ranging from campaigns on behalf of public health measures to hygiene instruction in primary schools."²⁰

A primary and obvious necessity is to heighten public appreciation of the importance of [dental] care, not only for its own sake but because of its relationship to total health care. To foster such heightened appreciation is admittedly a difficult task, but the Commission urges that the profession as well as public health agencies and civic and parent groups initiate new informational programs, expand old ones, and leave no opportunity unmet to bring the message home. Public and private schools can do much more than they now do in the field of dental health education. The press and other means of reaching large areas of the public should be enlisted as well.²¹ [sic]

Frances A. Stall's book, Dental Health Education,²² published in 1960, is an excellent reference for teachers and other non-dental groups who are to teach dental health. This book contains outlines to follow in the various grades, including lecture, discussion, and audio-visual aids for presenting the information on a level that could be understood by students in the specific grade being taught.

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The Commission on the Survey of Dentistry in the United States has offered several suggestions and recommendations for financing the cost of dental care. State and local communities are being urged to take more active responsibility in the establishment of dental care programs for children, with the feeling that if the child's teeth can be cared for while they are young, there will be some reduction in the accumulation of dental diseases and conditions in the future. Federal assistance, partial payment plans financed by communities or state health departments, or the utilization of public health programs for dental care are the three means available to those unable to pay for necessary care and treatment. If the family are able to pay, the cost of the dental care will be borne by them. The Commission further recommends that official health agencies begin to take the initiative in planning and administering dental care programs on a wider scale than is presently practiced.²³

Dental Health Problem in the United States Army

Although the United States Army and the civilian community share a similar problem in the shortage of professional personnel, the most important problem facing the United States Army is the high non-effective rate of the troops due to dental disease and conditions. Non-effective rate per 1000 average strength is defined as the average number of persons per day who are in an excused from duty (hospitalized or on quarters) status because of injury or disease.²⁴ Almost 18 million manhours would have been required to accomplish the necessary dental treatment of United States Army personnel in 1959.²⁵ For this same year, the full-time services of two-thirds of a division or about 10,000 soldiers were lost due to receiving

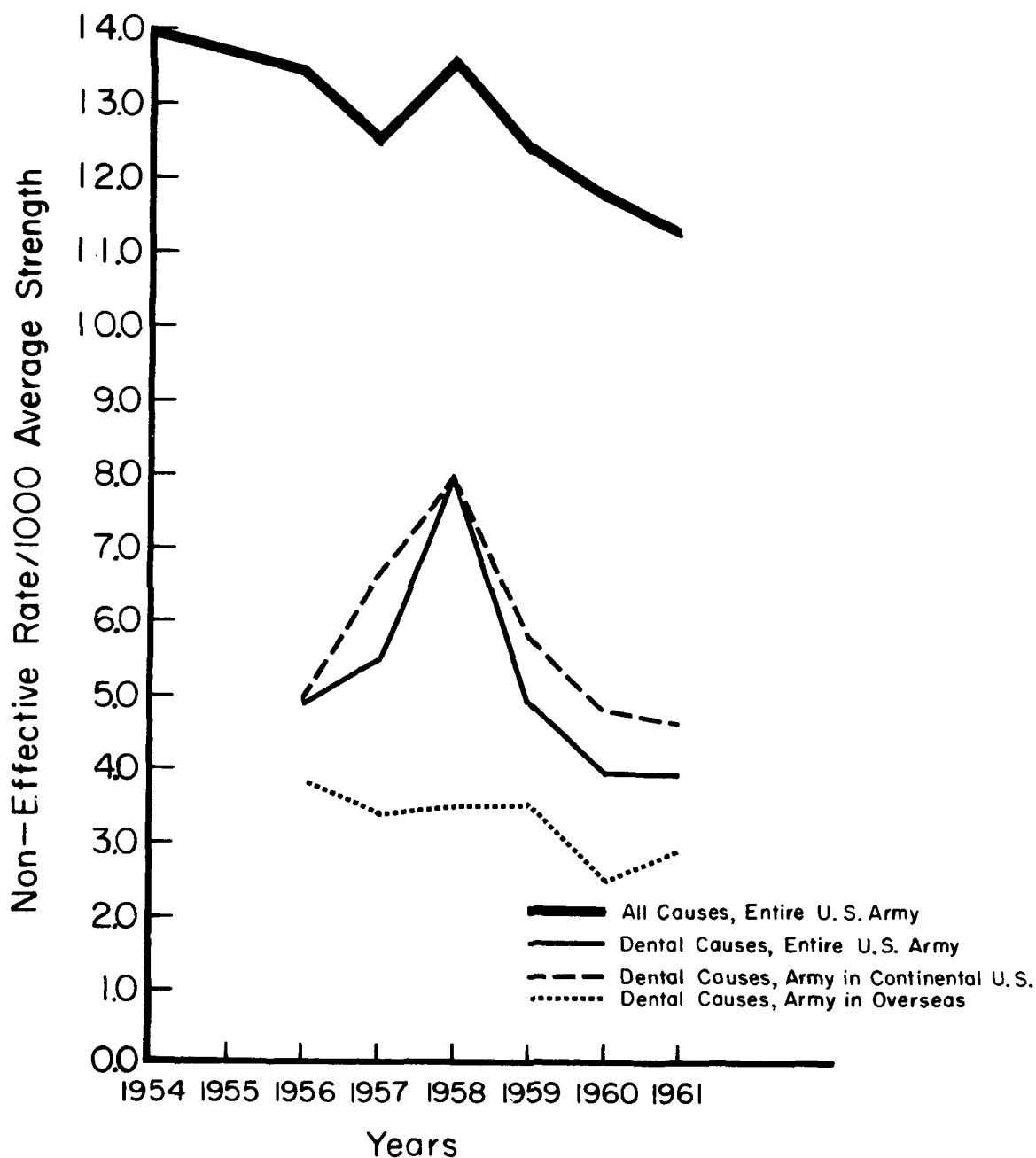
needed dental care, or an annual 8 million manhours dental treatment debt.²⁶

A high troop non-effective rate for dental treatment has been found to be particularly true in periods of essential training and combat.²⁷ Hobson observed in 1955, that out of 8,149 recruits drafted in that year, a total of 7.8 restorations would be required for every young man of draft age during his 2-year period in the Army, if he were to be discharged in a caries-free condition.²⁸

The Annual Report of the Army Surgeon General for the years 1954-1961 furnishes data relating to those Army personnel hospitalized or placed on quarters status for dental disease and conditions. These data represent only a very small portion of the total dental workload, since the majority of dental care in the United States Army is provided on an outpatient basis.²⁹ Figure 1 reveals the time lost from duty for all causes by Army personnel and the time lost for dental diseases and conditions for the years 1954-1961. It must be remembered that the information on this graph represents only the time lost from duty or the non-effective rate, and not the time spent by Army personnel treated on an outpatient basis for dental diseases and conditions.

Bernier and McFall in 1961 estimated the United States Army's annual dental treatment requirement to be 8 million manhours, with available Dental Corps officers being able to provide only 4 million of these manhours per year. Because of the yearly increase in caries alone, which would require an additional 4 million manhours, a debit of 8 million dental treatment manhours was estimated to exist annually. Therefore, techniques and manpower available are inadequate to meet the demands of

Figure 1.—Total and Dental Non-Effective Rates for CONUS and Overseas United States Army, Years 1954-1961.*



* Data unavailable for dental non-effective rates 1954-1955.

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dental treatment in the United States Army.³⁰

One prime element to be considered in relation to the dental health problem in the United States Army is the morale factor so essential to the esprit de corps of service personnel. One of the advantages provided the military member in the past has been the provision for medical and dental care to the members of his family at military medical installations. This care has been low-cost and uniformly available throughout the world wherever members of the military medical services have been stationed. This morale factor has been weakened to a large extent by the recent restrictions placed on dependent military dental care. There simply were not sufficient dentists in the United States Army to meet the military dental demands, let alone the additional burden of dependent dental treatment to an already overtaxed treatment facility.

Public Law 569, 84th Congress, 70 Statute, 252, the Dependents Medical Care Act was enacted to provide medical care in civilian hospitals to families of military personnel, when medical facilities of the services were unable to furnish this care." One of the most common criticisms of Medicare Program has been that it does not cover dental care."³¹ Consideration has been given to this criticism by the Dental Advisory Committee to the Assistant Secretary of Defense whereby they have "proposed an amendment to the Medicare Act which would authorize limited dental care to eligible dependents on a cost-participating basis."³² This proposal has been deferred until it gains the support of the American Dental Association.

However, there are certain specific instances in which dependent

dental care is authorized and provided on a space and facilities available basis. Dental care is furnished to dependents: as emergency care when it is necessary to relieve pain and suffering and as a necessary adjunct to medical or surgical treatment; as routine dental care specifically authorized in those areas of the United States designated as "remote" areas by the Secretary of the Army; and as routine dental care in overseas areas.³³ Even at those installations designated as "remote" areas, additional dental personnel are not authorized; therefore, the amount of dependent and active Army personnel dental care that is actually provided is greatly restricted.³⁴

Army Preventive Dentistry Program

Prior to publication of the recommendations stated by the Commission on the Survey of Dentistry in the United States in 1961, the Dental Service began to muster its forces to reduce the manpower losses caused by dental conditions and diseases by placing Army-wide emphasis on a preventive dentistry program. This Army Preventive Dentistry Program, first established in 1960 in a newsletter from the Chief, Dental Corps to all Dental Corps officers, is described in the Department of the Army Technical Bulletin-Medical 5, "Preventive Dentistry Program," dated 30 August 1962.³⁵ Major objectives are (1) the education of Army military personnel regarding dental health and (2) means of implementing this education. Efforts are presently being made to disseminate this dental health information to all levels of personnel within the Army structure.

The major responsibility for implementation of the Preventive Dentistry Program lies with Dental Corps officers. Employment of large group sessions, such as Officers Call, Dental In-Service Education, and

enlisted Troop Information Programs has been undertaken to disseminate dental health information to dental as well as non-dental Army personnel. Because of normal duty requirements, all personnel cannot attend these sessions, even though attendance is usually mandatory. Therefore, it may be assumed that not all non-dental personnel receive the information provided by Dental Corps officers as part of the Preventive Dentistry Program.

Because there are not enough Dental Corps officers to provide more than one-half of the necessary dental treatments Army-wide, let alone furnish knowledge of a dental health nature, other appropriate Army Medical Service (AMEDS) personnel may have to supplement the Dental Corps officers' efforts in disseminating dental health information to other individuals. Information of a dental health nature should be transmitted to hospitalized as well as individuals treated on an outpatient basis. It is on the hospitalized group of individuals, however, that non-dental AMEDS personnel should focus their major attention in instituting dental health hygiene as part of total patient care.

Since a large majority of Army military medical services are offered on an outpatient basis, the non-dental AMEDS personnel who are assigned to this type of facility should be as knowledgeable in the dental health field as are the individuals responsible for hospital patient care. However, do non-dental AMEDS personnel have the necessary knowledge to interpret correct dental health principles to their patients and to employ them in their own dental care?

Statement of the Study Problem

This survey was undertaken to ascertain the current level of dental

health knowledge possessed by selected AMEDS personnel, not to establish how or even if dental health information is being transmitted to hospital as well as out-patients of Army medical facilities.

Purpose of the Study

The purpose of this study was to identify and categorize the current level of dental health knowledge possessed by selected AMEDS personnel.

Limitations of the Study

1. This study was limited to a survey of selected AMEDS personnel assigned to one Class II and two Class I installations in the Second United States Army area.
2. Time was not available for adequate follow-up of non-respondents.

Assumption

The questionnaire replies are good indicators of the dental health knowledge possessed by the respondents.

Definition of Terms

Selected AMEDS personnel - Medical and Army Nurse Corps officers and non-dental AMEDS enlisted men and women who actually care for patients in hospitals and outpatient facilities.

Current level of dental health knowledge - the percentage of correct responses for a given question, individual, or study group.

METHOD

Pilot Study

A trial questionnaire (Appendix A) containing 54 dental health items was originally constructed utilizing material obtained from previous

personal experiences and related literature. The questions encompassed general information as well as public health measures in dental health and fell into one of the six broad areas contained within the questionnaire. In addition, background questions relating to position and attendance at a dental health oriented meeting were included for the purpose of formulating possible relationships. Areas covered in this questionnaire and questions related to each of these areas were:

| Area and related questions | Total number of questions in area |
|---|-----------------------------------|
| Dental Growth and Development Questions 1,13,15,22,30,31,33,36,43,46 | 10 multiple choice |
| Dental Diseases and Dental Caries Questions 4,17,18,25,27,28,34,35,38,39 40,44,45 | 13 multiple choice |
| Nutrition in Dental Health Questions 3,6,8,19,21,26 | 6 multiple choice |
| Preventive Measures in Dental Health Questions 2,9,14,20,29,32 | 6 multiple choice |
| Dental Care Questions 5,7,10,11,12,16,23,24,37,41,42 | 11 multiple choice |
| Anatomy and Conditions of the Teeth Questions 1,2,3,4,5,6,7,8; matching section | 8 matching |

Testing of the Pilot Instrument

The Chief, Preventive Dentistry, United States Army Institute of Dental Research, Walter Reed Army Medical Center, reviewed the material included in the trial questionnaire, suggested changes that were incorporated, and assisted the investigator in performing a validity test of the questionnaire items. The validity test was done by having 33 Dental

Corps officers assigned to Walter Reed Army Medical Center answer the questionnaire. The pilot instrument was also completed by six Army Nurse Corps officers, nine Medical Corps officers and five enlisted non-dental personnel to test for clarity and knowledge of dental health.

Results obtained from the pilot test of the instrument were reviewed jointly with the Chief, Preventive Dentistry, who served as project consultant, and decisions were made regarding items that should be utilized in the final questionnaire. Items eliminated from the final questionnaire did not represent a true indicator of dental health knowledge possibly possessed by non-dental AMEDS personnel.

Study Instrument

Areas covered in the questionnaire sent to the respondents (Appendix B) were the same as those listed for the trial questionnaire. The remembered 41-item questionnaire sent to the respondents was divided as follows:

| Area and related questions | Total number of questions in area |
|--|--------------------------------------|
| Dental Growth and Development Questions 1,11,13,18,24,26,27,31,33 | 9 multiple choice |
| Dental Diseases and Dental Caries Questions 15,21,22,29,32 | 5 multiple choice |
| Nutrition in Dental Health Questions 3,5,7,16,17 | 5 multiple choice |
| Preventive Measures in Dental Health Questions 2,8,12,23,25 | 5 multiple choice |
| Dental Care Questions 4,6,9,10,14,19,20,28,30 | 9 multiple choice |
| Anatomy and Conditions of the Teeth Questions 1,2,3,4,5,6,7,8; matching section | 8 matching |

The additional information requested in the pilot instrument, regarding position and attendance at a dental health oriented meeting was retained in the questionnaire sent to the respondents.

Method of Selecting Study Sample

Rosters of Medical Corps and Army Nurse Corps officers and non-dental enlisted men and women, carrying an MOS related to patient care, were requested and received through official channels from one Class II and two Class I military installations. From these rosters, current as of February 1, 1963, a 20 percent stratified random sample was selected. Individuals selected in this manner served as the sample in this survey. The letter forwarded with the questionnaire sent to Medical Corps officers may be found in Appendix C. Essentially the same letter was sent to both the Army Nurse Corps officers and non-dental enlisted men and women respondents.

Replics of the study respondents are analyzed in Chapter III.

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

A review of the current literature in the field of dental health was undertaken to assist in identifying the problem to be studied. In addition, literature associated with dental care, dental diseases and dental caries as well as the anatomy and growth and development of the teeth was examined to define the areas of knowledge to be included in the questionnaire.

Emphasis has been placed on the role nutrition and preventive measures play in caries formation. Because of the increased attention that nutrition and preventive measures have been and are currently receiving from dental workers and research personnel, only these allied areas will be reviewed.

Nutrition

Nutrition plays a contributing role in teeth and dental caries formation. Shaw stated that there are several factors which seem to control the incidence of dental caries. These factors are: the presence of oral microorganisms and carbohydrate deposits found around the tooth structures; the presence of saliva in the mouth; the body's systemic effect on the production of dental caries; and genetic and nutritional factors. He also pointed out that only the presence of microorganisms in the oral cavity and the deposits of carbohydrates can be controlled to any great extent.

Studies performed by Bibby revealed that foods principally composed of carbohydrates are the chief causative agents of dental caries, and caries occur at sites where retention of feedstuffs persist.³⁷ His experiments placed great emphasis on the form, composition or manner in which a sugar is used as a feedstuff.³⁸ Bibby states that if the frequency of eating could be reduced and palatable feedstuffs of low cariogenicity or with protective properties would be produced and substituted for the cariogenic foods now consumed, better control of caries formation could be achieved. He concluded that the frequency of eating is of more importance in the causation of caries than the total amount of carbohydrates or sugars eaten.³⁹

In 1956, Leicester wrote about misconceptions related to nutrition and teeth. He stated that the most widespread misconception was the belief that caries could be reduced or eliminated by feeding diets high in calcium contents to individuals after their teeth had formed.⁴⁰

Segnaes, in 1955, showed with rat experiments that susceptibility to dental decay was influenced by nutritional factors which operate during the period of tooth development rather than after the teeth have erupted.⁴¹

Another misinterpretation of a known fact pointed out by Leicester was the belief that diets rich in foods of high nutritious value would reduce caries formation. On the contrary, "a good diet in itself will not reduce or prevent caries."⁴² The feeling that "natural" foods, even sugars as are found in fruits or honey, are less harmful than "refined" sugars was noted as another common fallacy.⁴³

The form in which foods high in carbohydrate value is taken into the mouth has also been considered to be important in their cariogenic

effect. It was established by Leicester that if a considerable amount of fat is present along with sugars in the diet, less caries will result. The adherent quality or stickiness of the food eaten was also found to be important in producing caries.⁴⁴

Volker, conducting animal experiments, concluded that oral microorganisms and fermentable carbohydrates must be present in the mouth before any sign of an initial carious lesion could be observed.⁴⁵

Observations made of the salivary glucose clearance levels after the ingestion of a typical Army field ration revealed that "it is possible to maintain high salivary glucose levels for an hour and a half merely by ingesting a meal containing sugars and allied substances in a variety of forms."⁴⁶ Experiments performed on individuals eating, sucking, drinking and chewing 500 mgs. of glucose showed sugar clearance in the saliva to be dependent on the physical form in which sugar is eaten; the quantity is of secondary importance.⁴⁷

To summarize: nutrition does play an important role in the susceptibility of an individual's teeth structures to dental caries. It has been shown that not only the foods eaten, but also how often they are taken into the oral cavity is important in the formation of dental caries.

Preventive Measures in Dental Health

Tooth decay as a disease of local impact depends upon two all important factors, namely, the simultaneous presence of bacteria and a substrate readily available as a source of bacterial metabolism. Eliminating either factor from the oral cavity has resulted in the complete abrogation of dental caries in experimental animals.⁴⁸

Controversy exists as to the possible etiological agent of dental

caries. Some investigators have reported there is a direct relationship between the number of lactobacillus organisms found in the saliva and the individual's caries rate; as the number of lactobacilli increases, so does the rate of dental caries formation. Haslick, Jay and a group at the University of Michigan have studied the lactobacillus as an indicator for the dental caries incidence rate. They have investigated actual caries activity and have been able to correlate this activity with the number of lactobacilli in the saliva. The Michigan group is presently advocating a low cariogenic diet for those individuals found to have a high lactobacilli saliva count in an effort to reduce the incidence of dental caries. A group of workers at the National Institutes of Health considered a streptococcal organism as a possible etiological agent of dental caries and have been able to produce caries in germ-free animals using this streptococcal organism.⁴⁹

No agreement has been reached as to the one, or, possibly, group of etiological agents of dental caries. Concentrated effort is continually being expended by many workers in seeking a solution to the problem.

While research workers have been pursuing the search for the etiological agent or agents, measures presently available to reduce dental caries activity are being stressed by dental practitioners. These measures are: fluoridation of community water supplies; use of a stannous fluoride dentifrice; topical application of a stannous fluoride solution at least annually; and proper home care of the teeth and the gums between dental visits.

An entire issue of the American Journal of Social Issues⁵⁰ has been devoted to fluoridation of community water supplies and the role social scientists have been assuming by providing support, guidance and advice to dental groups in an attempt to overcome fluoridation opposition.

Muhler, at the University of Indiana, has conducted studies in past years which have shown that a stannous fluoride dentifrice, when used in conjunction with regular professional care, is an effective anticaries dentifrice.

Based on a thorough review of the extensive CREST clinical record, the Council on Dental Therapeutics adopted the following resolution:

"Crest" has shown to be an effective anticaries dentifrice that can be of significant value when used in a conscientiously applied program of oral hygiene and regular professional care; "Crest" dentifrice may also be of value as a supplement to public health procedures.⁵¹

Using a stannous fluoride dentifrice itself is not sufficient to significantly reduce the formation of dental caries. Keys, Overton and McKean in 1960, in a study performed at the United States Naval Academy, reported that a stannous fluoride dentifrice was not effective in reducing dental caries among the group of young men observed.⁵² The key point to be remembered in the resolution made by the Council on Dental Therapeutics is that Crest should be used in conjunction with "a conscientiously applied program of oral hygiene and regular professional care."⁵³ Teeth-brushing with Crest dentifrice is not enough; topical applications of stannous fluoride and prophylactic cleansing of the teeth have to be performed in addition, if the individual is to have a significant reduction in dental caries activity.

Muhler, in an article entitled "Preventive Dentistry in the Home,"⁵⁴ suggested that the use of proper toothbrushing technique, the use of the stannous fluoride dentifrice (Crest) and no eating between meals would reduce the formation of dental caries.

Looking ahead to the future, the United States Air Force School of Aerospace Medicine has evaluated five oral hygiene techniques which might be used by astronauts within the confines of their space ships. These five techniques were designed as possible ones which might be used within the restrictions of water, food, and space with which future astronauts will have to contend. The toothbrush and dental floss method proved to be as effective as the control (toothbrush, dentifrice, dental floss and water rinse) in maintaining good oral hygiene.⁵⁵

CHAPTER III

PRESENTATION, ANALYSIS AND INTERPRETATION OF DATA

Survey Population

Two hundred and seventy (270) dental health questionnaires were sent to selected non-dental Army Medical Service (AMEDS) personnel stationed in two small hospitals (Class I) and one large hospital (Class II) within the Second United States Army area. Of these, 83 (30.7%) were returned. The following table shows the respondent rate by study groups.

TABLE 1. RESPONDENT RATE BY STUDY GROUP, DENTAL HEALTH QUESTIONNAIRE, 1963.

| Study Group | Number of Questionnaires Sent | Number of Questionnaires Returned | Percent of Return |
|----------------------------------|-------------------------------------|---|-------------------------|
| Medical Corps Officers | 33 | 18 | 54.5% |
| Army Nurse Corps Officers | 24 | 13 | 54.2% |
| Enlisted Non-Dental Personnel | 213 | 52 | 24.4% |

There was no follow-up of the non-respondents, therefore, no explanation for the lower response rate of the enlisted non-dental personnel can be offered.

Findings

a. Correct Responses per Study Group

The mean percent of correct responses given by each respondent group for each of the six dental health areas utilized in this survey are presented in Table 2. The mean percent of correct responses for the overall dental health questionnaire by all respondents was 64.6%.

TABLE 2. MEAN PERCENT OF CORRECT RESPONSES FOR BROAD AREAS OF DENTAL HEALTH, SELECTED NON-DENTAL ARMED PERSONNEL, DENTAL HEALTH QUESTIONNAIRE, 1963.

| Re-spondent Group | Growth & Develop-ment | Dental Dis. & Dental Caries | Nutrition Related to Dental Health | Preven-tive Meas-ures in Dental Health | Den-tal Care | Anatomy & Con-ditions of Teeth | Total |
|--------------------|-----------------------|-----------------------------|------------------------------------|--|--------------|--------------------------------|-------|
| MC Officers | 68.5 | 77.8 | 47.8 | 42.2 | 88.3 | 99.4 | 70.7 |
| ANC Officers | 68.4 | 72.3 | 38.5 | 47.6 | 73.5 | 83.0 | 63.9 |
| Enlisted Personnel | 57.7 | 55.4 | 44.2 | 39.2 | 78.6 | 80.2 | 59.2 |

Data presented reveal a difference in current dental health knowledge between respondent groups as well as differences within the six broad areas of dental health contained in the questionnaire. The area of the questionnaire concerning "Anatomy and Conditions of the Teeth" provided the highest percent of correct responses, while the areas of "Nutrition Related to Dental Health" and "Preventive Measures in Dental Health" resulted in the lowest percent of correct answers for all three study groups. Responses in the area of "Anatomy and Conditions of the Teeth" might have revealed the higher scores in dental health knowledge simply because of a change in question technique. The items pertaining to this area were composed of matching questions, while the rest of the questionnaire contained multiple-choice questions. The mean percent of correct responses for each question by study group can be found in Appendix D.

Medical Corps officers have established the pattern of scoring the highest percent of correct responses in all areas. One exception to this pattern was in the area of "Preventive Measures in Dental Health," where the Nurse Corps officers scored a higher percent of correct answers.

The nurse officers have established a pattern of responses which is related to that of the medical officers, but with fewer appropriate replies. Two exceptions to this pattern were noticed in the areas of "Nutrition Related to Dental Health" and "Dental Care," in which the enlisted non-dental personnel presented a higher percent of correct responses than did the nurse officers. With these exceptions, the pattern established by the enlisted personnel respondents was one of scoring the lowest overall percent of appropriate responses among the three study groups.

b. Comparisons Between Groups

A difference of 25 percent or more between the responses of the study groups for each question was considered remarkable enough to bring to the reader's attention. These differences are shown on Tables 3a, 3b, and 3c.

The greatest difference found between the three study groups was in the area of "Dental Care." Ninety-one and one-half percent (12 out of 13) nurse officers answered question number 9 incorrectly, which had to do with dental treatment during pregnancy. (Question numbers mentioned in this section refer to the revised questionnaire, Appendix B). The medical officers and enlisted personnel groups did much better in answering this question correctly. A possible reason for the differences found between the study groups is that both the medical officers and enlisted personnel respondents are probably married and have had experience with dental treatment during pregnancy, while the nurse officers have not ordinarily had this experience.

TABLE 3. DIFFERENCES GREATER THAN 25 PERCENT IN CORRECT RESPONSES BETWEEN STUDY GROUPS, DENTAL HEALTH QUESTIONNAIRE, 1963.

3a. Medical Corps Officer Responses Minus Nurse Corps Officers Responses

| Area of Questionnaire | Question Number | Difference |
|---------------------------------|-----------------|------------|
| Dental Care | 9 | 59.0 |
| Dental Care | 20 | 37.1 |
| Nutrition | 5 | 47.0 |
| Nutrition | 16 | 28.2 |
| Anatomy and Conditions of Teeth | 1M* | 27.4 |
| Anatomy and Conditions of Teeth | 2M | 27.4 |
| Anatomy and Conditions of Teeth | 4M | 25.2 |
| Anatomy and Conditions of teeth | 6M | 30.8 |
| Anatomy and Conditions of Teeth | 7M | 45.1 |

3b. Medical Corps Officer Responses Minus Enlisted Personnel Responses

| Area of Questionnaire | Question Number | Difference |
|-----------------------------------|-----------------|------------|
| Dental Care | 20 | 48.7 |
| Dental Diseases and Dental Caries | 21 | 48.1 |
| Dental Diseases and Dental Caries | 22 | 38.6 |
| Growth and Development | 1 | 25.0 |
| Anatomy and Conditions of Teeth | 4M | 25.2 |
| Anatomy and Conditions of Teeth | 6M | 30.8 |
| Anatomy and Conditions of Teeth | 7M | 27.4 |
| Anatomy and Conditions of Teeth | 8M | 42.5 |

3c. Nurse Corps Officer Responses Minus Enlisted Personnel Responses

| Area of Questionnaire | Question Number | Difference |
|-----------------------------------|-----------------|------------|
| Dental Care | 9 | 50.0 |
| Dental Diseases and Dental Caries | 21 | 25.0 |
| Nutrition | 5 | -26.9 |
| Growth and Development | 26 | 30.7 |
| Anatomy and Conditions of Teeth | 8M | 32.7 |

*Matching questions are marked M.

There was a great difference noted in the responses given by the study groups to question number 5, which related to the source of calcium in the body during pregnancy if dietary calcium was not sufficient to meet body needs. Only 4 of the 13(30.8%) nurse officers responded correctly, while 14 of the 18(77.8%) medical officers and 30 of the 52 (57.7%) enlisted personnel answered appropriately. The experiences the medical officers and enlisted personnel have had with their wives' pregnancies again might be a possible reason for the higher percentage correct responses these groups had. Another possible reason for the differences noted might be the influence rendered nurse officers by the old wives' tale, "a tooth for every child," which remains a common fallacy among certain segments of the American population.

Question number 20 showed the medical officers to have a higher percentage of correct responses than did either of the other two groups. This question, related to "Dental Care," asked for the treatment of an accidentally knocked-out tooth. Evidently the nurse officer and enlisted personnel groups have not kept up with modern dental advances, such as reading related professional literature. It is now possible to reinsert a tooth accidentally knocked out if the person brings the tooth to a dentist immediately after the injury has occurred.

Most of the other major differences as noted in Table 3 were to be found in the dental health area of "Anatomy and Conditions of the Teeth." Again the medical officers as a group responded correctly more frequently than did the nurse officers. The percentage of nurse officers and the percentage of enlisted personnel answering these questions were

about the same. This was not so on question number 8 which asked for the best statement to describe the term "periodontal disease." A possible reason for the greater percentage of correct responses given this question by the nurse officer group is their educational exposure to anatomy during their school of nursing days, while the enlisted personnel respondents did not have this same educational opportunity. Also the nurse officer respondent group might have been more sophisticated than were the enlisted personnel group in choosing a statement that contained the word, "membrane" to describe the term of "periodontal membrane," as their correct response.

Question number 17 - "Which of the following forms of carbohydrates, after the eruption of teeth, is considered least responsible for dental caries production?"

- a. natural sugars (fruits or honey) with protein
- b. refined sugars with protein
- c. sugars, enriched with vitamins
- d. sugars with a large amount of fats

received the lowest number of correct answers of the entire questionnaire. In fact, none of the medical officers and only one nurse officer and six enlisted personnel responded correctly. This question was in the area of "Nutrition Related to Dental Health." The majority of the respondents incorrectly replied that natural sugars (fruits and honey) with protein were the least responsible for the formation of dental caries. This information is not new knowledge as has been previously described in the review of related literature.

e. Apparent Effect of the Preventive Dentistry Program

Of the 52 enlisted non-dental personnel respondents that returned a completed questionnaire, 17 had attended a program given by a Dental Corps

officer on the topic "Dental Health," "Preventive Dentistry Program," or other related topics; 27 had not and 8 respondents did not answer the question. None of the medical officers or nurse officers stated they had attended such a program.

The combined correct responses given by the enlisted personnel who had attended a dental health meeting were compared with the responses from those who had not attended. This comparison was made to see if attendance at such a meeting resulted in more correct answers to questions of a dental health nature. The results of this comparison are shown in Table 4.

TABLE 4. MEAN PERCENT OF CORRECT RESPONSES, BROAD AREAS OF DENTAL HEALTH, ENLISTED NON-MENTAL PERSONNEL, ATTENDANCE AND NON-ATTENDANCE OF A DENTAL HEALTH-ORIENTED MEETING, DENTAL HEALTH QUESTIONNAIRES, 1963

| Enlisted Personnel | Growth & Development | Dental Dis. & Dental Caries | Nutrition Related to Dental Health | Preventive Measures in Dental Health | Dental Care | Anatomy & Conditions of Teeth | Total |
|--------------------|----------------------|-----------------------------|------------------------------------|--------------------------------------|-------------|-------------------------------|-------|
| Attended | 58.8 | 58.8 | 42.4 | 34.1 | 77.8 | 78.7 | 58.4 |
| Did not Attend | 57.1 | 53.7 | 45.1 | 41.7 | 79.0 | 81.0 | 59.6 |
| Difference | 1.7 | 5.1 | -2.7 | -7.6 | -1.2 | -2.3 | -1.2 |

The greatest difference found between the two groups of enlisted personnel was in the area of "Preventive Measures in Dental Health."

A Chi-square analysis was made on the percentage of correct responses in this area to determine whether this difference was statistically significant or whether it was due to chance variation. The result of this test showed that the difference was not significant. Therefore, this difference and all lesser differences between the correct rates

of the two enlisted personnel groups appear to be due to chance alone. The data on this limited group of enlisted personnel suggest that attendance at a dental health program did not noticeably affect the correct responses rate.

The enlisted personnel group of respondents were the only group to answer the portion of the questionnaire regarding the good and bad points of the Preventive Dentistry Program and why this program was established. The medical officer group and nurse officer group of respondents either did not answer this portion of the questionnaire or had not attended a preventive dentistry program.

Consideration of comments offered by the enlisted personnel who had attended a dental health-oriented program reveals that the Army-wide emphasis placed on a preventive dentistry program is being favorably accepted. The respondents stated that the information they received by virtue of their attendance was interesting, informative and very valuable for their own dental health as well as that of their family. One respondent felt the discussion was too technical and another one saw the necessity for more dental lectures. These last two comments may lend insight into the lack of significance found in this survey.

Responses in answer to the question asking for opinions concerning the purpose for establishing a preventive dentistry program fall into several categories. These were: to eliminate undue dental problems in the future, to save the Armed Forces a loss of man-hours and money by preventing dental diseases and conditions through education, and to promote better dental health practices for personnel and patients alike. These answers are self-explanatory.

CHAPTER IV

SUMMARY, FINDINGS, AND RECOMMENDATIONS

Summary

The high non-effective troop rates caused by dental diseases and conditions are a dental health problem in the United States Army. Non-effective rates per 1,000 average strength have been defined as the average number of persons per day who are in an excused from duty (hospitalized or placed on quarters) status because of injury or disease. A high troop non-effective rate for dental treatment has been found to be particularly true in periods of essential training, such as basic training, and under combat conditions.

It has been estimated that the available Dental Corps personnel are able to provide only one-half of the necessary dental treatment required by Army personnel. Information from recruiting services indicates that the shortage of professional dental manpower will not be relieved in the near future.

The United States Army Dental Service in 1960 undertook to resolve the manpower losses caused by dental diseases and condition by placing Army-wide emphasis on a preventive dentistry program. The major responsibility for implementing the preventive dentistry program lies with Dental Corps officers. However, in view of the shortage of professional dental personnel, other appropriate Army Medical Service personnel (AMEDS) will have to supplement the Dental Corps officers' efforts in disseminating dental health information to other individuals.

Dental health knowledge will have to be transmitted to hospitalized as well as individuals treated on an outpatient basis. However, it is on

the hospitalized group of individuals that non-dental AMEDS personnel will have to focus their major attention when initiating dental health and hygiene practices as part of total patient care. The question is: Do non-dental AMEDS personnel have the necessary knowledge to interpret correct dental health habits to their patients and to employ them in their own dental care?

This survey was undertaken to ascertain the current level of dental health knowledge possessed by selected AMEDS personnel assigned to two Class I and one Class II medical installations in the Second United States Army area.

A trial dental health questionnaire was constructed utilizing material obtained from previous personal experience and a review of related literature. The trial questionnaire contained items which encompassed general information as well as public health measures in dental health. The items fall into one of six broad areas contained in the questionnaire which were: Growth and Development; Dental Diseases and Dental Caries; Nutrition related to Dental Health; Preventive Measures in Dental Health; Dental Care; and Anatomy and Conditions of the Teeth.

Assistance in a consultant capacity was furnished by the Chief, Preventive Dentistry, United States Army Institute of Dental Research, Walter Reed Army Medical Center, which included aid given the investigator in performing a test for validity on the trial questionnaire items by 33 Dental Corps officers. Reliability and clarity of the pilot instrument were also ascertained by means of requesting its completion by six Army Nurse Corps officers, nine Medical Corps officers, and five non-dental

personnel.

An overall 30.7% return response to the questionnaire was elicited, being divided into the following: 18 Medical Corps officers, 13 Army Nurse Corps officers, and 52 enlisted non-dental personnel, or 54.5%, 54.2% and 24.4% return respectively.

The mean percent of correct responses for the entire dental health questionnaire by all respondents was 64.6 percent. The dental health area of "Anatomy and Conditions of the Teeth" furnished the highest percentage of correct responses. "Nutrition" and "Preventive Measures in Dental Health" areas provided the lowest percentage of correct answers.

The Medical Corps officers presented the highest percentage of correct responses, the Army Nurse Corps officers ranked second the enlisted non-dental personnel had the lowest level of current dental health knowledge.

Study group differences in answering individual questions were observed. The greatest differences were found in the area of "Dental Care." The questions in this area that provided the greatest differences in percent of correct responses were number 9 and 20 (see Appendix B), while number 5 in the "Nutrition Related to Dental Health" area, furnished a great deal of difference also. The third area that produced differences in percent of correct responses was in "Anatomy and Conditions of the Teeth." Question number 17 had the smallest difference in percent of correct responses, in that very few of the respondents answered the question correctly. The Army Nurse Corps officers had the highest level of dental health knowledge regarding this question (7.7%) followed

by the enlisted non-dental personnel group (1.2%). None of the Medical Corps officers responded with the correct answer to this same question.

When a Chi-square test was used to test the number of correct responses given by enlisted personnel who had attended a dental health-oriented meeting against the correct responses of the enlisted personnel who had not attended such a meeting, there was no statistically significant difference noted between the two groups. Of the 17 enlisted personnel who had attended a dentally related meeting, all but one had positive feelings about the preventive dentistry program and why it was established.

Findings

1. Medical Corps officers appear to have a higher level of dental health knowledge than do Army Nurse Corps officers and enlisted non-dental personnel.
2. No statistical difference was observed between the responses of this limited sample given by enlisted personnel who had attended a dental health-oriented meeting and the responses given by enlisted personnel respondents who did not attend such a meeting.
3. Dental health knowledge of all study respondents was lowest in the two areas in which controversy exists; namely, the areas of "Nutrition Related to Dental Health" and "Preventive Measures in Dental Health."

Recommendations

1. Conduct a similar study in order to evaluate non-respondents, and to increase the sample population of Army Medical Service personnel beyond the Second United States Army area.

APPENDICES

● EXAMPLE OF PILOT INSTRUMENT

Directions:

Please circle the letter at the left of the one best answer.

1. At approximately what time in fetal development does calcification of the primary teeth begin?

- a. 1-2 months
- b. 3-5 months
- c. 6-8 months
- d. 9th month

2. Available statistics indicate that drinking water containing sodium fluoride has produced a 65% reduction in dental caries in which of the following groups, provided that the individuals have ingested this water for the entire period of time.

- a. all people in the community supplied with this water
- b. children from birth to 18 years
- c. young adults from 18 to 30 years
- d. adults, 30 years and older

3. 500 mgm of glucose has been found to have the shortest salivary clearance time when taken in which of the following forms:

- a. eating in the form of cake
- b. sucking a sugar tablet
- c. drinking liquid form of glucose
- d. chewing a gum base containing the glucose

4. One of the factors thought to be important in the formation of dental caries is:

- a. improper chewing of foods
- b. high sugar diet
- c. improper oral hygiene
- d. inadequate calcium intake

5. When a person has a fractured or aching tooth, he should:

- a. seek dental attention as soon as possible
- b. take aspirin for the relief of pain
- c. report the incident at the time of the next dental examination
- d. seek dental attention at the end of a few days if pain or discomfort is still present

6. When the intake of calcium is not sufficient during pregnancy, which of the following provides the calcium needed for fetal development?

- a. maternal teeth
- b. maternal metacarpal bones
- c. maternal muscles
- d. maternal long bones

7. If unable to brush as often as has been advocated, one can:

- a. chew gum in place of toothbrushing
- b. rinse the mouth with water after eating
- c. use fluoride lozenges
- d. wait until toothbrushing is possible

8. The form of carbohydrates eaten and the materials with which they are mixed are thought to be important in the etiology of dental caries. Also considered to be indicated in the role of caries formation is:

- a. the amount of carbohydrate foods eaten
- b. the frequency of eating
- c. the adherent quality of the carbohydrate foods eaten
- d. none of the above

9. Which of the following may be prescribed to promote dental caries reduction?

- a. oral penicillin tablets
- b. silver nitrate drinking solution
- c. fluoride tablets
- d. bacteriostatic mouth wash

10. During normal pregnancy,

- a. women should avoid dental treatments of any kind
- b. dental treatments can usually be performed without risk during the second trimester
- c. women's teeth are more prone to dental caries
- d. dental fillings do not stay in

11. What percentage of children at any given age need some form of orthodontic treatment?

- a. 10 percent or less
- b. more than 10 percent, less than 30 percent
- c. about 30 percent
- d. more than 30 percent

12. Teeth should be brushed with:

- a. a circular motion on the lateral surface of the teeth
- b. a rolling movement from the gums to the biting surface
- c. a horizontal movement on the lateral surface of the teeth
- d. none of the above

13. The six year molar is the
- a. third tooth from the midline
 - b. fourth tooth from the midline
 - c. fifth tooth from the midline
 - d. sixth tooth from the midline
14. How many parts per million of sodium fluoride is usually needed in drinking water to reduce dental caries?
- a. 5/10 parts per million or less
 - b. 5/10 to 1 part per million
 - c. 1-2 parts per million
 - d. more than 2 parts per million
15. What tissue of the tooth is the only one completely formed on eruption?
- a. cementum
 - b. dentin
 - c. pulp
 - d. enamel
16. Teeth and tongue should be brushed:
- a. when you feel like it
 - b. after eating and before retiring
 - c. when the teeth feel dirty
 - d. upon arising and before retiring
17. Of the children who live in areas of the United States with non-fluoridated water supplies, what percent enter first grade with one or more decayed teeth?
- a. 15-20 percent
 - b. 40-45 percent
 - c. 65-70 percent
 - d. 90-95 percent
18. The dental portion of the total medical costs in the United States per year is approximately:
- a. 1 billion dollars
 - b. 2 billion dollars
 - c. 50 billion dollars
 - d. 150 billion dollars

19. A "good diet:"
- will reduce or prevent the formation of dental caries
 - will not in itself reduce or prevent dental caries
 - should include large quantities of calcium
 - will reduce the number of times per day that the teeth should be brushed
20. Addition of fluoride to a community water supply for the control of dental caries per person per year costs:
- 10 cents or less
 - 10-99 cents
 - 1-2 dollars
 - more than 2 dollars
21. Which of the following forms of carbohydrates, after the eruption of teeth, is considered least responsible for dental caries production?
- natural sugars (fruits or honey) with protein
 - refined sugars with protein
 - sugars, enriched with vitamins
 - sugars with a large amount of fats
22. The alveoli in the jaws are:
- sockets in the bone within which the roots of the teeth are located
 - necessary for mastication
 - parts of the teeth that should be brushed regularly
 - parts of the teeth that are seen first on eruption
23. A child's mother or an adult should help him brush his primary teeth until:
- he starts to school
 - his first visit to the dentist
 - he develops skill in brushing
 - his first permanent teeth appear
24. If a tooth is accidentally knocked out, one should:
- get the person to the dentist as soon as possible
 - give first aid and reassure the patient
 - get the person and the tooth to the dentist immediately
 - rinse the mouth with salt water

25. After the age of 35 years, what is the greatest cause of tooth loss?
- a. tooth decay
 - b. trench mouth
 - c. periodontal disease
 - d. injuries
26. Following the ingestion of a typical Army field ration, a high salivary glucose level is maintained for approximately:
- a. 30 minutes or less
 - b. 30 minutes to one hour
 - c. one to two hours
 - d. more than two hours
27. At the present time, evidence seems to indicate which of the following are essential for the formation of dental caries?
- a. lactobacilli in the saliva
 - b. susceptible tooth structures
 - c. microorganisms and fermentable foods
 - d. b. and c. in combination
28. What percentage of the population of the US over 45 years of age, are wearing some type of dentures?
- a. less than 25 percent
 - b. more than 25 percent, less than 50 percent
 - c. about 50 percent
 - d. more than 50 percent
29. The most important factor in helping control dental caries is:
- a. periodic dental examinations
 - b. a well balanced diet
 - c. "adequate" oral hygiene
 - d. education of the public in dental health
30. Where is the wisdom tooth located?
- a. first molar from the midline
 - b. third molar from the midline
 - c. first incisor from the midline
 - d. third incisor from the midline

31. The calcium content of the enamel is thought to be subject to metabolic changes:

- a. only during the pre-eruptive stage of the tooth
- b. during the eruptive stage of the tooth
- c. during the pre-eruptive and eruptive stages of the tooth
- d. only after the tooth has erupted through the gum

32. What medication has been found to be most effective as an anti-cariogenic substance?

- a. single application of silver nitrate to the tooth surfaces
- b. oral penicillin (one tablet per day for one year)
- c. single 8% stannous fluoride application
- d. a series of 4 applications of a 2% sodium fluoride to the tooth surfaces

33. During the developmental stage of the fetus, which one of the following organs is most sensitive to systemic influences?

- a. heart
- b. kidney
- c. tooth
- d. lung

34. The national average of new dental caries in the permanent teeth per child per year is about:

- a. 1 new cavity
- b. 2 new cavities
- c. 3 new cavities
- d. 4 or more cavities

35. The cost of dental services per year per capita in the United States is:

- a. \$5 or less
- b. \$6 to \$10
- c. \$11 to \$15
- d. more than \$15

36. How many teeth are in a complete primary set?

- a. 14
- b. 16
- c. 18
- d. 20

37. The most important reason for brushing teeth is:

- a. to prevent tooth decay
- b. to stimulate the gums
- c. both of the above
- d. neither of the above

38. At the age of two years, what percentage of the children in the United States have at least two dental caries?

- a. 20 percent
- b. 40 percent
- c. 60 percent
- d. 80 percent

39. The usual age for cleft lip surgery is:

- a. immediately after birth
- b. within the first four weeks of life
- c. before the child's second birthday
- d. after the first temporary tooth appears

40. During World War II, what percentage of drafted young males required immediate treatment for the relief of pain?

- a. 20 percent
- b. 40 percent
- c. 60 percent
- d. 80 percent

41. The term "oral hygiene" implies which of the following?

- a. brushing the teeth
- b. brushing the gums
- c. brushing the tongue
- d. all of the above

42. A child's first visit to the dentist should be at approximately what age?

- a. 2 years or earlier
- b. 2-3 years
- c. 3-4 years
- d. 4 years or later

43. At approximately what age does the first permanent tooth appear?

- a. 5 years
- b. 6 years
- c. 7 years
- d. 8 years

44. A period of severe mental stress may be followed by the development of acute dental caries in adults. This stress:

- a. can have an acute onset and be short lived
- b. must have had an onset of several months
- c. is related to hormonal changes in the normal healthy adult
- d. cannot be established as having a causal relationship in the formation of acute dental caries

45. Healthy gums:

- a. do not bleed unless traumatically injured
- b. should not be stimulated with toothbrushing
- c. should be massaged only if they are painful
- d. should be stimulated with a sharp pointed object such as a match stick

46. How many teeth are in a complete permanent set?

- a. 28
- b. 30
- c. 32
- d. 34

In the blank at the left, please place the number of the statement on the right which best describes the term.

Anatomy and Conditions of the Teeth

- | | |
|---------------------------|--|
| _____ Crown | 1. A hard deposit which can collect around the neck of the tooth. |
| _____ Neck | 2. The hard white outside structure of the tooth. |
| _____ Enamel | 3. The part of the tooth in the jaw. |
| _____ Root | 4. The part of the tooth which is normally above the gum line. |
| _____ Calculus | 5. The part of the tooth at the gum line. |
| _____ Pulp | 6. The tissue or membrane around the root of the tooth. |
| _____ Dentin | 7. The bony tissues of the tooth enclosing the pulp cavity. |
| | 8. The part of the tooth which contain the nerve and blood supply. |
| _____ Peridental Membrane | 9. A tooth with a non-vital or dead pulp. |

What is your MOS? _____

(Enlisted Personnel only). Have you ever worked in a dental clinic?

Yes _____ No _____

Have you ever attended any program given by a member of the Dental Corps on the topic, "Dental Health," "Preventive Dentistry Program," or other related topics?

Yes _____ No _____

If you have answered YES to the preceding question, please answer the following ones. If your answer to the last question is NO, you are finished with this questionnaire.

If you have answered YES, when did you attend such a meeting or program?

Year

Did other members of the command attend this meeting or program also?

Yes _____ No _____

What did you think about this program or meeting?

Good points.

Bad points.

Why do you think the Preventive Medicine program was established?

EXAMPLE OF STUDY QUESTIONNAIRE

DEPARTMENT OF NURSING
Walter Reed Army Institute of Research
Walter Reed Army Medical Center
Washington 12, D. C.

Directions:

Please circle the letter at the left of the one best answer.

1. At approximately what time in fetal development does calcification of the primary teeth begin?

- a. 1-2 months
- b. 3-5 months
- c. 6-8 months
- d. 9th month

2. Available statistics indicate that drinking water containing sodium fluoride has produced a 65% reduction in dental caries in which of the following groups, provided that the individuals have ingested this water for the entire period of time.

- a. all people in the community supplied with this water
- b. children from birth to 18 years
- c. young adults from 18 to 30 years
- d. adults, 30 years and older

3. 500 mgm of glucose has been found to have the shortest salivary clearance time when taken in which of the following forms:

- a. eating in the form of cake
- b. sucking a sugar tablet
- c. drinking liquid form of glucose
- d. chewing a gum base containing the glucose

4. When a person has a fractured or aching tooth, he should:

- a. seek dental attention as soon as possible
- b. take aspirin for the relief of pain
- c. report the incident at the time of the next dental examination
- d. seek dental attention at the end of a few days if pain or discomfort is still present

5. When the intake of calcium is not sufficient during pregnancy, which of the following provides the calcium needed for fetal development?

- a. maternal teeth
- b. maternal metacarpal bones
- c. maternal muscles
- d. maternal long bones

7. If unable to brush as often as has been advocated, one can:

- a. chew gum in place of toothbrushing
- b. rinse the mouth with water after eating
- c. use fluoride lozenges
- d. wait until toothbrushing is possible

8. The form of carbohydrates eaten and the materials with which they are mixed are thought to be important in the etiology of dental caries. Also considered to be indicated in the role of caries formation is:

- a. the amount of carbohydrate foods eaten
- b. the frequency of eating
- c. the adherent quality of the carbohydrate foods eaten
- d. none of the above

9. Which of the following may be prescribed to promote dental caries reduction?

- a. oral penicillin tablets
- b. silver nitrate drinking solution
- c. fluoride tablets
- d. bacteriostatic mouth wash

10. During normal pregnancy,

- a. women should avoid dental treatments of any kind
- b. dental treatments can usually be performed without risk during the second trimester
- c. women's teeth are more prone to dental caries
- d. dental fillings do not stay in

11. What percentage of children at any given age need some form of orthodontic treatment?

- a. 10 percent or less
- b. more than 10 percent, less than 30 percent
- c. about 30 percent
- d. more than 30 percent

12. Teeth should be brushed with:

- a. a circular motion on the lateral surface of the teeth
- b. a rolling movement from the gums to the biting surface
- c. a horizontal movement on the lateral surface of the teeth
- d. none of the above

13. The six year molar is the
- a. third tooth from the midline
 - b. fourth tooth from the midline
 - c. fifth tooth from the midline
 - d. sixth tooth from the midline
14. How many parts per million of sodium fluoride is usually needed in drinking water to reduce dental caries?
- a. 5/10 parts per million or less
 - b. 5/10 to 1 part per million
 - c. 1-2 parts per million
 - d. more than 2 parts per million
15. What tissue of the tooth is the only one completely formed on eruption?
- a. cementum
 - b. dentin
 - c. pulp
 - d. enamel
16. Teeth and tongue should be brushed:
- a. when you feel like it
 - b. after eating and before retiring
 - c. when the teeth feel dirty
 - d. upon arising and before retiring
17. Of the children who live in areas of the United States with non-fluoridated water supplies, what percent enter first grade with one or more decayed teeth?
- a. 15-20 percent
 - b. 40-45 percent
 - c. 65-70 percent
 - d. 90-95 percent
18. The dental portion of the total medical costs in the United States per year is approximately:
- a. 1 billion dollars
 - b. 2 billion dollars
 - c. 50 billion dollars
 - d. 150 billion dollars

19. A "good diet:"
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 - will not in itself reduce or prevent dental caries
 - should include large quantities of calcium
 - will reduce the number of times per day that the teeth should be brushed
20. Addition of fluoride to a community water supply for the control of dental caries per person per year costs:
- 10 cents or less
 - 10-99 cents
 - 1-2 dollars
 - more than 2 dollars
21. Which of the following forms of carbohydrates, after the eruption of teeth, is considered least responsible for dental caries production?
- natural sugars (fruits or honey) with protein
 - refined sugars with protein
 - sugars, enriched with vitamins
 - sugars with a large amount of fats
22. The alveoli in the jaws are:
- sockets in the bone within which the roots of the teeth are located
 - necessary for mastication
 - parts of the teeth that should be brushed regularly
 - parts of the teeth that are seen first on eruption
23. A child's mother or an adult should help him brush his primary teeth until:
- he starts to school
 - his first visit to the dentist
 - he develops skill in brushing
 - his first permanent teeth appear
24. If a tooth is accidentally knocked out, one should:
- get the person to the dentist as soon as possible
 - give first aid and reassure the patient
 - get the person and the tooth to the dentist immediately
 - rinse the mouth with salt water

25. After the age of 35 years, what is the greatest cause of tooth loss?
- a. tooth decay
 - b. trench mouth
 - c. periodontal disease
 - d. injuries
26. Following the ingestion of a typical Army field ration, a high salivary glucose level is maintained for approximately:
- a. 30 minutes or less
 - b. 30 minutes to one hour
 - c. one to two hours
 - d. more than two hours
27. At the present time, evidence seems to indicate which of the following are essential for the formation of dental caries?
- a. lactobacilli in the saliva
 - b. susceptible tooth structures
 - c. microorganisms and fermentable foods
 - d. b. and c. in combination
28. What percentage of the population of the US over 45 years of age, are wearing some type of dentures?
- a. less than 25 percent
 - b. more than 25 percent, less than 50 percent
 - c. about 50 percent
 - d. more than 50 percent
29. The most important factor in helping control dental caries is:
- a. periodic dental examinations
 - b. a well balanced diet
 - c. "adequate" oral hygiene
 - d. education of the public in dental health
30. Where is the wisdom tooth located?
- a. first molar from the midline
 - b. third molar from the midline
 - c. first incisor from the midline
 - d. third incisor from the midline

31. The calcium content of the enamel is thought to be subject to metabolic changes:

- a. only during the pre-eruptive stage of the tooth
- b. during the eruptive stage of the tooth
- c. during the pre-eruptive and eruptive stages of the tooth
- d. only after the tooth has erupted through the gum

32. What medication has been found to be most effective as an anti-cariogenic substance?

- a. single application of silver nitrate to the tooth surfaces
- b. oral penicillin (one tablet per day for one year)
- c. single 8% stannous fluoride application
- d. a series of 4 applications of a 2% sodium fluoride to the tooth surfaces

33. During the developmental stage of the fetus, which one of the following organs is most sensitive to systemic influences?

- a. heart
- b. kidney
- c. tooth
- d. lung

34. The national average of new dental caries in the permanent teeth per child per year is about:

- a. 1 new cavity
- b. 2 new cavities
- c. 3 new cavities
- d. 4 or more cavities

35. The cost of dental services per year per capita in the United States is:

- a. \$5 or less
- b. \$6 to \$10
- c. \$11 to \$15
- d. more than \$15

36. How many teeth are in a complete primary set?

- a. 14
- b. 16
- c. 18
- d. 20

37. The most important reason for brushing teeth is:

- a. to prevent tooth decay
- b. to stimulate the gums
- c. both of the above
- d. neither of the above

38. At the age of two years, what percentage of the children in the United States have at least two dental caries?

- a. 20 percent
- b. 40 percent
- c. 60 percent
- d. 80 percent

39. The usual age for cleft lip surgery is:

- a. immediately after birth
- b. within the first four weeks of life
- c. before the child's second birthday
- d. after the first temporary tooth appears

40. During World War II, what percentage of drafted young males required immediate treatment for the relief of pain?

- a. 20 percent
- b. 40 percent
- c. 60 percent
- d. 80 percent

41. The term "oral hygiene" implies which of the following?

- a. brushing the teeth
- b. brushing the gums
- c. brushing the tongue
- d. all of the above

42. A child's first visit to the dentist should be at approximately what age?

- a. 2 years or earlier
- b. 2-3 years
- c. 3-4 years
- d. 4 years or later

43. At approximately what age does the first permanent tooth appear?

- a. 5 years
- b. 6 years
- c. 7 years
- d. 8 years

44. A period of severe mental stress may be followed by the development of acute dental caries in adults. This stress:

- a. can have an acute onset and be short lived
- b. must have had an onset of several months
- c. is related to hormonal changes in the normal healthy adult
- d. cannot be established as having a causal relationship in the formation of acute dental caries

45. Healthy gums:

- a. do not bleed unless traumatically injured
- b. should not be stimulated with toothbrushing
- c. should be massaged only if they are painful
- d. should be stimulated with a sharp pointed object such as a match stick

46. How many teeth are in a complete permanent set?

- a. 28
- b. 30
- c. 32
- d. 34

In the blank at the left, please place the number of the statement on the right which best describes the term.

Anatomy and Conditions of the Teeth

- | | |
|--------------------------|--|
| ____ Crown | 1. A hard deposit which can collect around the neck of the tooth. |
| ____ Neck | 2. The hard white outside structure of the tooth. |
| ____ Enamel | 3. The part of the tooth in the jaw. |
| ____ Root | 4. The part of the tooth which is normally above the gum line. |
| ____ Calculus | 5. The part of the tooth at the gum line. |
| ____ Pulp | 6. The tissue or membrane around the root of the tooth. |
| ____ Dentin | 7. The bony tissues of the tooth enclosing the pulp cavity. |
| | 8. The part of the tooth which contain the nerve and blood supply. |
| ____ Peridontal Membrane | 9. A tooth with a non-vital or dead pulp. |

What is your MOS? _____

(Enlisted Personnel only). Have you ever worked in a dental clinic?

Yes _____ No _____

Have you ever attended any program given by a member of the Dental Corps on the topic, "Dental Health," "Preventive Dentistry Program," or other related topics?

Yes _____ No _____

If you have answered YES to the preceding question, please answer the following ones. If your answer to the last question is NO, you are finished with this questionnaire.

If you have answered YES, when did you attend such a meeting or program?

Year

Did other members of the command attend this meeting or program also?

Yes _____ No _____

What did you think about this program or meeting?

Good points.

Bad points.

Why do you think the Preventive Medicine program was established?

WALTER REED ARMY INSTITUTE OF RESEARCH
WALTER REED ARMY MEDICAL CENTER
WASHINGTON 12, D.C.



IN REPLY REFER TO:
MEDEC-ZHN

Dear Medical Corps Officer:

As a student in the Military Nursing Practice and Research Course, conducted by the Department of Nursing, Walter Reed Army Institute of Research, I am requesting your aid in a research project in dental health. Being an Army health nurse, my particular interest lies in the area of dental health knowledge.

The inclosed questionnaire, validated by the Dental Corps officers assigned to the Walter Reed Army Medical Center, was developed to gain information concerning the type and amount of dental health knowledge of non-dental Army medical personnel. Your name was randomly selected as one of the Medical Corps officers.

I would appreciate it very much if you would complete the attached questionnaire and return it to me in the inclosed self-addressed envelope as soon as possible, but no later than 30 March 1963. The completion of this questionnaire will take approximately 20-30 minutes of your time.

Replies to this questionnaire will remain anonymous. The identification number found on the first page of the questionnaire is for coding purposes only. I would appreciate it very much if you would avoid referring to dental health materials or conferring with your colleagues for answers to any of the questions.

This study has the approval of the Director of Dental Activities, Walter Reed Army Medical Center; the Director, United States Army Institute of Dental Research; the Director and Commandant, Walter Reed Army Institute of Research; the Chief, Army Nurse Corps; and the Chief, Department of Nursing, Walter Reed Army Institute of Research.

Thank you for your cooperation in support of an Army Nurse Corps student research project.

Should you wish a summary of this study, please fill in the request form found at the end of the questionnaire, and I will be only too happy to send you a copy upon its completion.

Sincerely yours,

Amy D. Geissinger

AMY D. GEISSINGER
Captain, ANC
Student Research Nurse

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as

MEAN PERCENT OF CORRECT RESPONSES PER QUESTION, BY SELECTED NON-DENTAL
ARMY MEDICAL SERVICE PERSONNEL, DENTAL HEALTH QUESTIONNAIRE, 1963.

| Question Number | Respondent Groups | | |
|------------------------|---------------------------|------------------------------|----------------------------------|
| | Medical Corps Officers | Army Nurse Corps Officers | Enlisted non-dental Personnel |
| Multiple Choice | | | |
| 1 | 50.0 | 46.2 | 25.0 |
| 2 | 77.8 | 76.9 | 53.8 |
| 3 | 61.1 | 69.2 | 61.5 |
| 4 | 94.4 | 84.6 | 96.2 |
| 5 | 77.8 | 30.8 | 57.7 |
| 6 | 94.4 | 84.6 | 80.8 |
| 7 | 33.3 | 46.2 | 36.5 |
| 8 | 33.3 | 38.5 | 46.2 |
| 9 | 66.7 | 7.7 | 57.7 |
| 10 | 83.3 | 69.2 | 76.9 |
| 11 | 44.4 | 38.5 | 38.5 |
| 12 | 27.8 | 46.2 | 26.9 |
| 13 | 44.4 | 61.5 | 42.3 |
| 14 | 94.4 | 92.3 | 100.0 |
| 15 | 44.4 | 61.5 | 44.2 |
| 16 | 66.7 | 38.5 | 51.9 |
| 17 | 0.0 | 7.7 | 1.2 |
| 18 | 100.0 | 84.6 | 78.8 |
| 19 | 100.0 | 100.0 | 98.1 |
| 20 | 83.3 | 46.2 | 34.6 |
| 21 | 100.0 | 76.9 | 51.9 |
| 22 | 94.4 | 76.9 | 55.8 |
| 23 | 40.0 | 46.2 | 23.1 |
| 24 | 94.4 | 76.9 | 86.5 |
| 25 | 38.9 | 30.8 | 40.4 |
| 26 | 50.0 | 69.2 | 38.5 |
| 27 | 83.3 | 76.9 | 59.6 |
| 28 | 83.3 | 76.9 | 71.2 |
| 29 | 44.4 | 43.8 | 28.8 |
| 30 | 94.4 | 100.0 | 100.0 |
| 31 | 66.7 | 69.2 | 57.7 |
| 32 | 100.0 | 92.3 | 96.2 |
| 33 | 88.9 | 92.3 | 92.3 |
| Matching | | | |
| 1 | 88.9 | 61.5 | 69.2 |
| 2 | 88.9 | 61.5 | 73.1 |
| 3 | 100.0 | 84.6 | 82.7 |
| 4 | 94.4 | 59.2 | 69.2 |
| 5 | 100.0 | 76.9 | 78.8 |
| 6 | 100.0 | 69.2 | 69.2 |
| 7 | 88.9 | 43.8 | 61.5 |
| 8 | 94.4 | 84.6 | 51.9 |

LIST OF REFERENCES

1. United States Army Institute of Dental Research, Walter Reed Army Institute of Research, Preventive Dentistry, Syllabus. Walter Reed Army Medical Center, Washington, D. C.: 1962. p.77 (extract: Inc 5 MUSA ltr, MUSA 10-F, 27 Jan 61, subject: "Monthly Troop Information Plan for Feb. 1961").
2. American Council on Education, Dentistry in the United States: Status, Needs and Recommendations, "Summary Report of the Commission on the Survey of Dentistry in the United States," Washington, D. C.: 1961. p. 1.
3. Ibid, pp 2-3.
4. Friedrich, Rudolph, et al. "Better Dental Health," Reference Papers on Children and Youth, Washington, D. C.: White House Conference on Children and Youth, Inc. 1960. pp 205-206.
5. Ibid, p. 206.
6. Pelton, Walter J. and Wisan, Jacob M. Dentistry in Public Health, 2nd Edition, Philadelphia: Saunders Publishing Company, 1955. p. 79.
7. American Council on Education, op. cit., p. 3.
8. United States Army Institute of Dental Research, loc. cit., p. 25.
9. American Council on Education, op. cit., p. 3.
10. Ibid, p. 10.
11. Ibid, pp. 2-3.
12. United States Army Institute of Dental Research, loc. cit., p. 29.
13. American Council on Education, op. cit., p. 3.
14. United States Army Institute of Dental Research, loc. cit., p. 31.
15. American Council on Education, op. cit., p. 27.
16. Ibid, p. 39.
17. Ibid, pp. 27-28.
18. Mercer, Victor H. "Effectiveness of Single SnF₂ Topical Technic," J. D. Res., 39: 4, July - August, 1960. p. 680.

19. Hine, Maynard K. "Prophylaxis, Toothbrushing and Home Care of the Mouth as a Caries Control Measure," Dental Caries Mechanisms and Present Control Techniques, Easlick, Kenneth A. First Edition St. Louis: C. V. Mosby Co., 1948. pp. 67-73.
20. American Council on Education, loc. cit., p. 11.
21. Ibid, pp. 3-4.
22. Stoll, Frances A., Dental Health Education. Second Edition, Philadelphia: Lea and Febiger, 1960. pp 1-253.
23. American Council on Education, loc. cit., p 14.
24. Department of the Army, Office of The Surgeon General, "Medical Statistics in the United States Army," Annual Report of the Surgeon General, Washington: 1954, p. 132.
25. United States Army Institute of Dental Research, loc. cit., p 3.
26. Ibid, p 4.
27. Department of the Army, Department of the Army Technical Bulletin, TM Med 5, "Preventive Dentistry Program," Washington, D. C.: 30 August 1962, p 1.
28. Hobson, Robert W. "Dental Examinations of 8, 138 Army Recruits," Dental Abstracts, No. 2, July 1957, p 407.
29. Department of the Army, "Medical Statistics in the United States Army," loc. cit., p 106.
30. United States Army Institute of Dental Research. [Reprinted from Journal of the American Dental Association, 62: 717-723, 1961] p. 4.
31. Department of the Army, Office of The Surgeon General, Annual Report: The Surgeon General, United States Army, Washington, D. C. Fiscal Year 1959; p 33.
32. Ibid, p 34.
33. Ibid, pp 33-34.
34. Department of the Army, Annual Report, Fiscal Year 1959, loc. cit., p 34.
35. Department of the Army, Department of the Army Technical Bulletin, DA Cit., pp 1-4.

36. Shaw, James H., "Factors Controlling the Incidence of Dental Caries," American Medical Association, Council on Foods and Nutrition, Nutrition in Tooth Formation and Dental Caries, Symposium on Nutrition in Tooth Formation and Dental Caries, Boston: 19 May 1960, p 6.
37. Bibby, Basil G., "Cariogenicity of Foods," American Medical Association, Council on Foods and Nutrition, Nutrition in Tooth Formation and Dental Caries, Symposium on Nutrition in Tooth Formation and Dental Caries, Boston: 19 May 1960, p 50.
38. Symposium, "Effects of Sugars and other Carbohydrates on the Teeth," JADA, 51: 269, September, 1955.
39. Bibby, Basil G., "Effect of Sugar Content of Feedstuffs on Their Caries-Producing Potentialities," JADA, 51: 302, September 1955.
40. Leicester, Henry M. "Nutrition and the Teeth," JADA, 52: 248 March 1956.
41. Segnaes, Reidar F., "Effect of Ingested Sugars and Other Carbohydrates on the Resistance of Teeth to Caries," JADA 51: 277. September, 1955.
42. Leicester, p 284.
43. Ibid, p 288
44. Ibid, p 288
45. Valke, J. F. "Relation of Oral Biochemistry of Sugars to the Development of Caries," JADA, 51: 285, September, 1955.
46. Ibid, p 286.
47. Ibid, p 285.
48. Muhler, Joseph C. and Hine, Maynard K. Editors. A Symposium on Preventive Dentistry; With Specific Emphasis on Dental Caries and Periodontal Diseases, St. Louis: C. V. Mosby Co., 1956, p 33.
49. Personal Communication, Gilmore, Eleanor L., Research Bacteriologist, U. S. Army Institute of Dental Research, Walter Reed Army Medical Center, Washington, D. C., 5 April 1963.
50. Paul, Benjamin D., Ganssen, William A., and Kegales, S. Stephen, "Trigger for Community Conflict: The Case of Fluoridation" The Journal of Social Issues, 17: 1-84, No. 4, 1961.

51. Prester and Gumble, Division of Dental Research. "Dentistry: Constant Progress Through Constant Study." AM-2089-F, Cincinnati, Ohio. p 2.
52. Kays, F. M., Overton, H. J., and McKean, T. W., "Clinical Trials of Caries - Inhibitory Dentifrices." J. D. Res., 39: 697, August 1960.
53. Prester and Gumble, op. cit., p 1.
54. Mahler, Joseph C. "Practice Preventive Dentistry," J. Tenn. State Dental Association, 41: 43, January 1961.
55. United States Air Force School of Aerospace Medicine, Aerospace Medical Division (AFMC), "A Method of Selecting an Oral Hygiene Technic for Use in Space Action Simulator Flights," Technical Documentary Report USAM-TDR-62-110, Brooks Air Force Base, Texas. January, 1963, p 1.